

Honors Algebra 2A Final Exam Review

Name:

Quadratics

- Solving
 - zero-product property
 - square roots
 - completing the square
 - quadratic formula
- Imaginary & Complex Numbers
 - operations (add, subtract, multiply)
 - rationalize the denominator
- Graphing
 - vertex form (transformation rules)
 - standard form
 - intercept form
- Inequalities
 - solve algebraically by testing critical points

Polynomials

- Characteristics
 - w/o graphing calculator (end behavior, # turns, name, possible zeros, factor to find zeros)
 - w/graphing calculator (relative minimums, relative maximums, zeros, evaluating)
- Operations
 - add, subtract, multiply
 - factor (difference of cubes)

Systems & Matrices

- 3 equations & 3 unknowns algebraically
 - substitution or elimination
- Matrix Operations
 - add, subtract, scalar multiplication, multiplication
- Solve Matrix Equations
 - inverse matrices
- Solve System of Equations with Matrices
 - inverse matrices
 - Cramer's Rule

Absolute Value & Transformations

- Graph Absolute Value Functions
- Use Transformation Rules for any Function
- Write Absolute Value Function as a Piecewise Function
- Identify Domain and Range

Quadratics

Graph the function.

1. $y = x^2 - 1$

2. $y = x^2 - 2x + 1$

3. $y = 2(x - 1)^2$

4. $y = -(x + 2)(x - 2)$

5. $y = x^2 - 2x - 3$

6. $y = \frac{1}{2}x^2 - \frac{1}{2x} - \frac{23}{8}$

7. $y = -2(x - 1)^2 + 5$

8. $y = 4(x - 2)(x - 4)$

9. $y = -\frac{3}{2}(x + 2)^2 + 5$

Factor

10. $x^2 - 49$

11. $q^2 - 11q + 24$

12. $9v^2 - 13v + 4$

13. $x^4 - 81$

24. $8x^3 - 125$

15. $18x^3 - 9x^2 - 18x + 9$

16. $x^{2n} + 3x^n - 10$

17. $2x^2 - 7x - 9$

18. $16x^3 + 250$

Solve the quadratic equation by the indicated method.

Zero-Product Property

19. $4x^2 - 6x - 18 = 0$

20. $t^2 = 6t + 55$

Square-Root

21. $3a^2 = 24$

22. $x^2 + 9 = 0$

Completing the Square

23. $x^2 - 6x + 5 = 0$

24. $x^2 - 3x + 5 = 0$

Quadratic Formula

25. $2x^2 + 6x + 5 = 0$

26. $x^2 + 9x = 10$

Simplify

27. $(7 - 4i) + (8 + 6i)$

28. $(-2 + 15i) - (8 - 3i)$

29. $(5 - i)(9 + 3i)$

30. $\frac{6i}{1 - 2i}$

31. $\sqrt{3} \cdot 2\sqrt{3}$

32. $\frac{13i}{1 - 2i}$

Solve the quadratic inequality.

33. $3x^2 - 13x > 10$

34. $-4x^2 - x + 3 \leq 0$

Polynomials

State the end behavior of the polynomial function.

35. $y = -3x^3 - 2x$

$$\begin{array}{l} x \rightarrow -\infty \\ f(x) \rightarrow \end{array}$$

$$\begin{array}{l} x \rightarrow +\infty \\ f(x) \rightarrow \end{array}$$

36. $y = x - 3x^3 + 4x^4$

$$\begin{array}{l} x \rightarrow -\infty \\ f(x) \rightarrow \end{array}$$

$$\begin{array}{l} x \rightarrow +\infty \\ f(x) \rightarrow \end{array}$$

37. $f(x) = x^5 - 2x^2 + x - 3$

$$\begin{array}{l} x \rightarrow -\infty \\ f(x) \rightarrow \end{array}$$

$$\begin{array}{l} x \rightarrow +\infty \\ f(x) \rightarrow \end{array}$$

38. $f(x) = 100x^{21} - 23x^{14}$

$$\begin{array}{l} x \rightarrow -\infty \\ f(x) \rightarrow \end{array}$$

$$\begin{array}{l} x \rightarrow +\infty \\ f(x) \rightarrow \end{array}$$

39. $f(x) = -9x^4 + 2x^3 - 3x$

$$\begin{array}{l} x \rightarrow -\infty \\ f(x) \rightarrow \end{array}$$

$$\begin{array}{l} x \rightarrow +\infty \\ f(x) \rightarrow \end{array}$$

Perform the indicated operation.

40. $(6w^3 + 2w^2 - 3w - 1) + (-5w^3 + 9w - 8)$

41. $(-x^4 + x^2 - x - x^3 + 1) + (x^2 - 2x^3 + 4x - 1)$

42. $(b^4 + 10b) - (4b^3 + 6b^2 - b + 5)$

43. $\left(\frac{1}{4}c^3 - 3c^2 + \frac{5}{6}\right) - \left(\frac{1}{5}x^3 - 9x + \frac{2}{3}\right)$

44. $\left(\frac{1}{2}x - \frac{1}{4}y\right)^2$

45. $(2x - y)(2x + y)$

46. $2w^3(w^2 - 10w + 4)$

47. $(h - 3)(h^2 + 2h - 8)$

Using a graphing calculator:

48. Find the relative maximum(s), relative minimum(s), zeros, y-intercept of
 $y = 2x^3 - 11x^2 + 3x - 54$

Without a Graphing Calculator, Graph: (zeros, end-behavior, y-int, multiplicity)

49. $y = 4x^5 - 40x^3 + 36x$

50. $y = (x - 2)^2(x + 3)(x + 4)$

Systems & Matrices

Solve the system algebraically

$$\begin{aligned} 4x + 2y + 3z &= 1 \\ 51. \quad 2x - 3y + 5z &= -14 \\ 6x - y + 4z &= -1 \end{aligned}$$

$$\begin{aligned} 3x + y + z &= 14 \\ 52. \quad -x + 2y - 3z &= -9 \\ 5x - y + 5z &= 30 \end{aligned}$$

Perform the indicated operation

53.

$$3 \begin{bmatrix} 2 & 3 \\ 4 & 1 \\ 2 & 4 \end{bmatrix} + \begin{bmatrix} 1 & -1 \\ -2 & 5 \\ -7 & 9 \end{bmatrix}$$

54.

$$\begin{bmatrix} 2 & 1 & -3 \\ 4 & 0 & 5 \end{bmatrix} \begin{bmatrix} 1 & 3 \\ 2 & 4 \\ 3 & -2 \end{bmatrix}$$

55.

$$\begin{vmatrix} 4 & 9 \\ -5 & -11 \end{vmatrix}$$

56.

$$\begin{vmatrix} 2 & 0 & 8 \\ -1 & 7 & 9 \\ 12 & 5 & -3 \end{vmatrix}$$

57.

$$6 \begin{bmatrix} 6 & 4 \\ 9 & -3 \\ 5 & 11 \end{bmatrix} - 2 \left(\begin{bmatrix} 1 & 0 \\ 5 & 3 \\ 9 & 4 \end{bmatrix} + \begin{bmatrix} 5 & 2 \\ 7 & 3 \\ 9 & -4 \end{bmatrix} \right)$$

58. solve for x

$$\begin{bmatrix} 3 & 6 \\ 8 & -5 \end{bmatrix} - \begin{bmatrix} 8 & 1 \\ 10 & -4x \end{bmatrix} = \begin{bmatrix} -5 & 5 \\ -2 & 19 \end{bmatrix}$$

59. solve for x & y

$$\begin{bmatrix} -2 & 1 & 2 \\ 3 & 2 & 4 \\ 0 & -2 & 4 \end{bmatrix} \begin{bmatrix} 1 \\ x \\ 3 \end{bmatrix} = \begin{bmatrix} 6 \\ 19 \\ y \end{bmatrix}$$

Find the inverse (without a graphing calculator)

60. $\begin{bmatrix} 6 & -2 \\ 7 & -2 \end{bmatrix}$

61. $\begin{bmatrix} 11 & -5 \\ 3 & -1 \end{bmatrix}$

62. $\begin{bmatrix} 3 & -2 \\ 6 & -4 \end{bmatrix}$

Solve using the indicated method (if there is one).

63. Cramer's Rule

$$\begin{aligned} x - y + 2z &= 6 \\ -2x + 3y - z &= -7 \\ 3x + 2y + 2z &= 5 \end{aligned}$$

64. Inverse Matrix

$$\begin{aligned}3x + y - 2z &= 3 \\ -2x + 2y + 3z &= -14 \\ 5x - y - 3z &= 25\end{aligned}$$

65. $\begin{bmatrix} -7 & -9 \\ 4 & 5 \end{bmatrix} X + \begin{bmatrix} 3 & 4 \\ 4 & -3 \end{bmatrix} = \begin{bmatrix} 1 & 9 \\ 6 & -6 \end{bmatrix}$

Absolute Value & Transformations

Graph and state the domain and range.

66. $y = |x - 3| + 2$

67. $y = \frac{3}{4}|x|$

68. $y = -4|x + 2| + 3$

Given $f(x) = (2, 0), (1, 2), (-2, 3), (-4, -1)$

69. $y = \frac{1}{2}f(x + 2) - 3$

70. $y = -2f(x - 3) + 1$

Write the absolute value function as a piecewise function.

71. $y = 2|x - 2| + 4$

72. $y = -\frac{1}{2}|x + 2| - 1$

Applications

73. **Enrollment** A high school's enrollment is 950 students, which includes sophomores, juniors, and seniors. Twice the sophomore enrollment is three times the senior enrollment, and the total number of juniors and seniors enrolled is 200 more than the number of sophomores enrolled.

Use either Cramer's Rule or an inverse matrix to solve the system of equations. Show the setup of the method you choose.

74. From 1970 to 2002, the average yearly pineapple consumption P (in pounds) per person in the United States can be modeled by the function $P(x) = 0.0000984x^4 - 0.00712x^3 + 0.162x^2 - 1.11x + 12.3$ where x is the number of years since 1970. In what year was the pineapple consumption about 9.97 pounds?

75. A go-cart track has about 380 racers per week and charges each racer \$35 to race. The owner estimates that there will be 20 more racers per week for every \$1 reduction in the price per racer. How can the owner of the go-cart track maximize weekly revenue?
76. A campground rents campsites for \$12 per night. At this rate, 90 campsites are usually rented. For each \$1 increase in the price per night, about 3 less sites are rented. How much should the campground charge per site to get their maximum revenue? What is the maximum revenue?
77. A package has a length 10 inches greater than its width and a height 12 inches less than its width.
- Determine the polynomial function that will calculate the volume of a package with width w .
 - To carry this package onto an airplane, it cannot be larger than 4800 cubic inches. What should its dimensions be if you want to have the maximum allowable volume?
78. A bottle rocket travels along a parabolic path and reaches a maximum height of 21 feet after traveling a horizontal distance of 7 feet. Write a quadratic function in any form that models the bottle rocket's path, assuming it leaves the ground at the point $(0,0)$.
79. A rectangular garden is 25 feet long by 10 feet wide. You have enough mulch to cover 1000 square feet. You would like to extend both the length and the width of the garden by x feet to use up all of the mulch. Write and solve an equation to represent the area of a new garden.